

SEMESTRAL
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**PRÁCTICA
DIRIGIDA**

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Reduce

$$A = 36\sin^3 x + 12\sin^3 3x + 4\sin^3 9x + \sin 27x$$

- A) $\sin x$ B) $3\sin x$ C) $9\sin x$
D) $18\sin x$ ~~E) $27\sin x$~~

IDENTIDADES DE DEGRADACIÓN

$$4\sin^3 \theta = 3\sin \theta - \sin 3\theta$$

$$A = 9(4\sin^3 x) + 3(4\sin^3 3x) + 4\sin^3 9x + \sin 27x$$

$$A = 9(3\sin x - \sin 3x) + 3(3\sin 3x - \sin 9x) + 3\sin 9x - \cancel{\sin 27x} + \cancel{\sin 27x}$$

$$A = 27\sin x - \cancel{9\sin 3x} + \cancel{9\sin 3x} - \cancel{3\sin 9x} + \cancel{3\sin 9x}$$

$$\therefore A = 27\sin x$$

Reduce

$$\frac{\sin^3(2\alpha)\sin(\alpha) + \cos^3(2\alpha)\cos(\alpha)}{3\cos(\alpha) + \cos(7\alpha)}$$

$$\alpha = 0^\circ \rightarrow E = \frac{0 + 1}{3 + 1} = \frac{1}{4}$$

$$\text{A) } \frac{1}{4}$$

$$\text{B) } \frac{1}{2}$$

$$\text{C) } \frac{1}{3}$$

$$\text{D) } \frac{2}{5}$$

$$\text{E) } \frac{3}{7}$$

RESOLUCIÓN

$$E = \frac{4 \sin^3 2\alpha \sin \alpha + 4 \cos^3 2\alpha \cos \alpha}{4(3 \cos \alpha + \cos 7\alpha)}$$

$$E = \frac{(3 \sin 2\alpha - \sin 6\alpha) \sin \alpha + (3 \cos 2\alpha + \cos 6\alpha) \cos \alpha}{4(3 \cos \alpha + \cos 7\alpha)}$$

$$E = \frac{3 \sin 2\alpha \sin \alpha + 3 \cos 2\alpha \cos \alpha + \cos 6\alpha \cos \alpha - \sin 6\alpha \sin \alpha}{4(3 \cos \alpha + \cos 7\alpha)}$$

$$E = \frac{3 \cos(2\alpha - \alpha) + \cos(6\alpha + \alpha)}{4(3 \cos \alpha + \cos 7\alpha)}$$

$$\therefore E = \frac{\cancel{3 \cos \alpha + \cos 7\alpha}}{\cancel{4(3 \cos \alpha + \cos 7\alpha)}} = \frac{1}{4}$$

IDENTIDADES DE DEGRADACIÓN

$$4\sin^3\theta = 3\sin\theta - \sin 3\theta$$

$$4\cos^3\theta = 3\cos\theta + \cos 3\theta$$

Elimine x de $\frac{\sin(x)}{a} = \frac{\sin(3x)}{b} = \frac{\sin(5x)}{c}$.

A) $a(a+c) = b(b+a)$

☒ B) $a(a+c) = b(b-a)$

C) $a(a-c) = b(b-a)$

D) $a(a-c) = b(b+a)$

E) $a(a+b) = b(b-c)$

$$\sin 3\theta = \sin \theta (2 \cos 2\theta + 1)$$

$$\sin A + \sin B = 2 \sin\left(\frac{A+B}{2}\right) \cos\left(\frac{A-B}{2}\right)$$

RESOLUCIÓN

$$\text{I)} \quad \frac{\cancel{\sin x}}{a} = \frac{\cancel{\sin x} (2 \cos 2x + 1)}{b} \rightarrow 2 \cos 2x = \frac{b-a}{a}$$

$$\text{II)} \quad \frac{\sin 3x}{b} = \frac{\sin 5x + \sin x}{a+c} \quad \dots \text{propiedad de proporciones}$$

$$\frac{\cancel{\sin 3x}}{b} = \frac{2 \cancel{\sin 3x} \cos 2x}{a+c} \rightarrow 2 \cos 2x = \frac{a+c}{b}$$

$$\text{igualando: } \frac{b-a}{a} = \frac{a+c}{b}$$

$$\rightarrow a(a+c) = b(b-a)$$

Si $A+B+C=90^\circ$, simplifique la expresión:

$$\frac{\operatorname{sen}(2A) + \operatorname{sen}(2B) + \operatorname{sen}(2C)}{4\cos(A)\cos(B)\cos(C)}$$

Sea: $A=B=C=30^\circ \rightarrow E = \frac{\frac{3\sqrt{3}}{2}}{\frac{3\sqrt{3}}{2}} = 1$

A) $\frac{1}{2}$

B) $\frac{1}{4}$

~~C) 1~~

D) 2

E) 4

Si $A+B+C=180^\circ$, entonces

$$\operatorname{sen}A + \operatorname{sen}B + \operatorname{sen}C = 4\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$$

$$\cos A + \cos B + \cos C = 4\operatorname{sen}\left(\frac{A}{2}\right)\operatorname{sen}\left(\frac{B}{2}\right)\operatorname{sen}\left(\frac{C}{2}\right) + 1$$

$$\operatorname{sen}2A + \operatorname{sen}2B + \operatorname{sen}2C = 4\operatorname{sen}A\operatorname{sen}B\operatorname{sen}C$$

$$\cos 2A + \cos 2B + \cos 2C = -4\cos A\cos B\cos C - 1$$

$$A+B+C=90^\circ \begin{cases} \operatorname{sen}(A+B) = \cos C \\ \operatorname{sen} C = \cos(A+B) \end{cases}$$

$$E = \frac{2\operatorname{sen}(A+B)\cos(A-B) + 2\operatorname{sen}C\cos C}{4\cos A\cos B\cos C}$$

$$E = \frac{2\cos C \cdot \cos(A-B) + 2\cos(A+B)\cos C}{4\cos A\cos B\cos C}$$

$$E = \frac{2\cos C (\cos(A-B) + \cos(A+B))}{4\cos A\cos B\cos C} = 1$$

Si: $\tan\left(\frac{7x}{2}\right) = n \tan\left(\frac{5x}{2}\right)$, la expresión:
 $\cos(5x) + \cos(3x) + \cos(x)$ equivale a:

- A) $\frac{n+1}{2n-1}$ ~~B) $\frac{n+1}{2n-2}$~~ C) $\frac{2n+1}{2n-1}$
 D) $\frac{3n+1}{2n+1}$ E) $\frac{2n-1}{3n-1}$

$$\sin 3\theta = \sin \theta (2\cos 2\theta + 1)$$

Dato: $\frac{\sin \frac{7x}{2}}{\cos \frac{7x}{2}} = \frac{n \sin \frac{5x}{2}}{\cos \frac{5x}{2}}$

RESOLUCIÓN

$$2 \sin \frac{7x}{2} \cos \frac{5x}{2} = n \cdot 2 \sin \frac{5x}{2} \cos \frac{7x}{2}$$

$$\sin 6x + \sin x = n (\sin 6x - \sin x)$$

$$(n+1) \sin x = (n-1) \sin 6x \rightarrow \frac{\sin 6x}{\sin x} = \frac{n+1}{n-1}$$

Pide: $E = (\cos 5x + \cos x) + \cos 3x$

$$E = 2 \cos 3x \cos 2x + \cos 3x$$

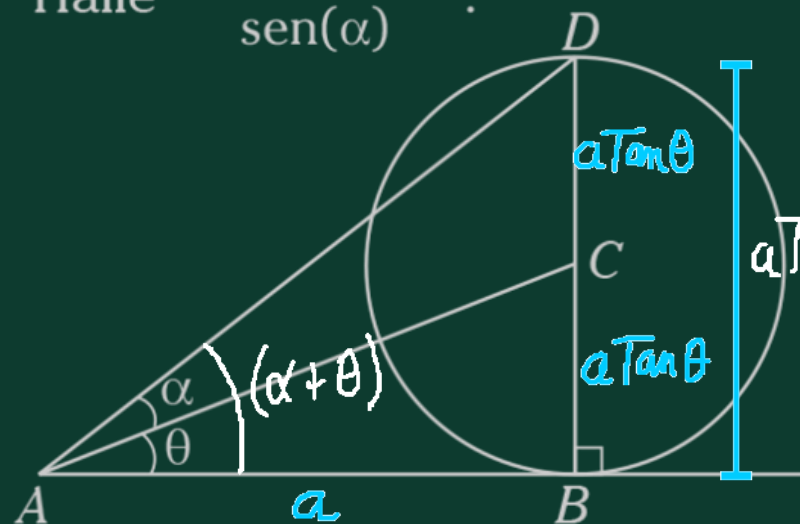
$$E = \cos 3x (2 \cos 2x + 1)$$

$$E = \frac{2}{2} \cos 3x \cdot \frac{\sin 3x}{\sin x} = \frac{\sin 6x}{2 \sin x}$$

$$\therefore E = \frac{n+1}{2(n-1)}$$

Si C es centro de la circunferencia mostrada en la figura.

Halle $\frac{\text{sen}(2(\theta) + \alpha)}{\text{sen}(\alpha)}$.



A) 7

B) 6

C) 5

D) 4

E) 3

$$\tan(\alpha + \theta) = 2 \tan \theta$$

$$\frac{\text{sen}(\alpha + \theta)}{\cos(\alpha + \theta)} = \frac{2 \text{sen} \theta}{\cos \theta}$$

$$2 \text{sen}(\alpha + \theta) \cos \theta = 2 \text{sen} \theta \cos(\alpha + \theta)$$

$$\text{sen}(2\theta + \alpha) + \text{sen} \alpha = 2(\text{sen}(2\theta + \alpha) - \text{sen} \alpha)$$

$$3 \text{sen} \alpha = \text{sen}(2\theta + \alpha)$$

$$\therefore \frac{\text{sen}(2\theta + \alpha)}{\text{sen} \alpha} = 3$$

Calcule el valor de

$$f = \frac{1}{2 \cos 20^\circ} - 2 \cos 40^\circ$$

~~A) -1~~

B) 1

C) 2

D) 3

E) -2

RESOLUCIÓN

$$F = \frac{1 - 2(2 \cos 40^\circ \cos 20^\circ)}{2 \cos 20^\circ}$$

$$F = \frac{1 - 2(\cos 60^\circ + \cos 20^\circ)}{2 \cos 20^\circ}$$

$$F = \frac{1 - 2\left(\frac{1}{2} + \cos 20^\circ\right)}{2 \cos 20^\circ}$$

$$F = \frac{\cancel{1} - \cancel{1} - 2 \cos 20^\circ}{2 \cos 20^\circ} = -1$$

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